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S P O T L I G H T

The Play's the Thing

For over three decades, Arvind Gupta has been taking science to children with toys made from junk



Alifiya Khan

WHAT ARVIND Gupta would really like, after three decades of evangelising science education to young children, is to have every neighbourhood and housing society give them a lab to tinker. "We make gyms, we make playgrounds, why not tinkering centres? Let the kids come and get their hands dirty together and let's watch what they make. They are brilliant minds, you will see," he says.

The 64-year-old has just been awarded the Padma Shri for his long career in education. Central to his life's work is his Toys for Trash initiative — over 1,500 science experiments done with the discarded material of everyday life, from matchsticks to safety pins to old newspapers. They have been captured in over 8,500 videos, translated or dubbed into 18 languages.

But, wait, don't give his work a bad name by calling it science. "Science has become a degraded word. Kids start panicking when they hear it. Teachers, who have never dirtied their hands, have never experienced the joy of making, are teaching science. We need to make science fun. This chalk-and-talk method is dead," says Gupta, over phone from Chennai, where he is nursing a collar bone injury and babysitting his granddaughter. ("She's asleep now, we can talk.")

Gupta was an engineer in his 20s, a graduate of IIT Kanpur, when he was drawn to ideas of alternative education. In 1978, he took a year off his job in Telco, Pune, and spent six months at the Paliya Pipariya village of Bankhedi block in Hoshangabad district in Madhya Pradesh, where an Indian academic had set up a pioneering school. This was the famous Hoshangabad Experiment, started by Anil Sadgopal, a PhD from California Institute of Technology, who had quit a high-paying job to teach science to village children.

It was a time of tumult in India and the world, Gupta remembers. In a Ted Talk in 2010, he speaks of being inspired by the po-

litical churning of the time. "The slogan of the early 1970s was 'go to the people, live with them, build from what they know'," he says.

Those six months spent in the village was a turning point. "In the village, I used things sold in the weekly bazaar. I bought a bicycle valve tube. From someone's house, I took a few used matchsticks. You cut the valve tube into small pieces, scrape off the matchstick head and push it through the valve tube. Push another matchstick through the other end of the tube, joining both head to head inside the tube.

Using these simple tools, we can create a triangle, a pentagon, a hexagon or a house — your own homegrown meccano! I called it the Matchstick Meccano and thus began my experiments," says Gupta.

By 1980, he had quit his job and plunged into teaching, choosing to "make toys rather than trucks". He wrote his first book, *Matchstick Models and Other Science Experiments*, in 1985, published jointly by Eklavya and the National Council for Science and Technology Communication. Professor Yash Pal, then secretary of the Union Department of Science of Technology, commissioned an original print run of 2,000 copies. But once the late scientist read the book, 25,000 copies were printed and the book eventually got translated in 12 languages. He went on to write 25 books on various science experiments and is currently translating one of them in Hindi, his mother tongue.

In the 1980s, Gupta moved to Delhi from Pune, because his daughter, four years old then, wasn't happy with the "authoritarian" schooling there. He stopped sending her to school and would instead take her to the sprawling Empress Garden, because he felt she could learn much more observing the

TEACH WITH TRASH

Arvind Gupta (top); and a child with a spiral snake

flowers and the birds. In Delhi, he enrolled her in an experimental school run by Aurobindo Ashram, and took up producing episodes for *Tarang*, a show for Doordarshan. For 25 years, he made over 125 programmes on making toys from trash that reached the remotest parts of India. Till today, he receives letters from viewers of *Tarang*. "After the Padma award, emails and letters are pouring in. Some of them are the '80s and '90s kids. They say their children are doing the experiments they had watched on TV from my website now," he says.

Why trash, though? "Because it is accessible, low-cost, readily available to the poorest of the poor child. In a democracy, the benefits of science must reach all sections of society, because it can empower them. In a world which generates so much junk, we also need to clean up our act," he says.

In 2003, Gupta returned to Pune after he was offered work at the Mukhtangan Science Centre at the Inter-University Centre for Astronomy and Astrophysics (IUCAA), established by the astrophysicist Jayant Narlikar, who was also passionate about the cause.

With two other colleagues, he ran a twice-a-week science programme, where school children could come and tinker with

science toys. It was the time when the internet was reaching more people. The team together made 1,100 science videos from a 400 sq feet room at IUCAA and uploaded them online. "A student from the Dominic Republic, who was studying at the university, heard about us and translated the videos in Spanish, so children in her country could try them too. PK Nanavati, who was associated with Dr Narendra Dabholkar, dubbed 1,000 videos in Kannada," he says.

When he wasn't making videos, he went to a school run on the Pune University campus, run for children from a nearby slum. Carrying his most prized possession, his *jhola* — which contained matchsticks, threadspools, buttons, rubber tubes and more — he helped students construct dozens of science toys, like the simple electric motor and the levitating pencil, in which ring magnets are used to keep a spinning pencil afloat in air.

He remembers one of those students, Durga Jetty, who had to scrub vessels in four houses before attending school. "She was ingenious, she made a turbine out of discarded bottles. We documented it and a newspaper wrote about it. She got 517 cheques amounting to Rs 7 lakh. She is an engineer today. There were hundreds of such students, that's the potential of these kids. But you need to catch them young," he says.

Throughout his career, he says he had a meagre income but jokes that he had "wife", and not life insurance. His spouse's salary from a teaching job at Fergusson College, Pune, often paid the bills while he was left free to educate and innovate. "I feel extremely privileged, I got to live my dream and do what I believed in," he says.

At the heart of this belief is the importance of allowing children to play. "Play is very serious business, if there is no play, there is no learning. It is more important than schooling. Through it, you learn to negotiate, to be fair, to follow rules. In play, no one is judging you, so if you haven't done it well, you do it better until you get the trick, i.e. until you have learnt," he says.

Gupta retired from active work around four years ago and now lives in Chennai with his daughter. But his work has a new life, thanks to the interwebz. A few months ago, he got a mail from teachers in Germany who were teaching Syrian children in refugee camps. "The children spoke a different language, were traumatised and found it difficult to open up. They were looking for some low-cost activities, and tried some of our experiments with them. They said the children loved it. That gleam in the eyes of children, it has inspired me my entire life," he says.

